

cent for photographic and 4 per cent for thermometric records.

The details are shown in the preceding table, in which the stations are arranged according to the *total possible* duration of sunshine, and not according to the *observed* duration as in previous years.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which reports of thunderstorms for the whole country were most numerous were: 1st, 40; 2d, 64; 16th, 73.

Thunderstorm reports were most numerous in: Louisiana, 27; Missouri, 42; Ohio, 50.

Thunderstorms were most frequent in: Louisiana, 9 days; Arizona and Ohio, 7; Missouri and Texas, 6.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 14th to the 22d, inclusive. On the remaining twenty-two days of this month 104 reports were received, or an average of about 5 per day. The dates on which the number of reports especially exceeded this average were: 1st, 15; 2d, 52.

Auroras were reported most frequently in: Montana and South Dakota, 7 days; North Dakota, 6.

The number of reports was a large percentage of the number of observers in: Vermont, 62; Maine, 56; South Dakota, 37; Montana, 30; North Dakota, 25.

CANADIAN REPORTS.

A thunderstorm was reported at Montreal on the 21st.

Auroras were reported as follows: Halifax, 14th; Father Point, 30th; Quebec, 1st; Banff, 1st, 2d; Minnedosa, 2d, 3d, 5th, 28th, 30th; Qu'Appelle, 2d; Swift Current, 2d, 19th; Calgary, 1st, 3d, 26th, 27th; Prince Albert, 1st; Battleford, 2d, 3d, 4th; Kamloops, 2d.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 42.2°, or 0.7° below normal; the highest was 83°, at Healing Springs on the 12th, and the lowest, 7° below zero, at Valleyhead on the 28th. The average precipitation was 3.60, or 1.76 below normal; the greatest monthly amount, 5.74, occurred at Greensboro, and the least, 1.23, at Pineapple.—*F. P. Chaffee.*

Arizona.—The mean temperature was 46.3°, or 6.3° above normal; the highest was 80°, at Maricopa, and the lowest, 5°, at Fort Apache on the 7th. The average precipitation was 3.16, or 2.16 above normal; the greatest monthly amount, 8.30, occurred at Pinal Ranch, and the least, 0.23, at San Simon.—*W. T. Blythe.*

Arkansas.—The mean temperature was 38.9°, or 0.7° below normal; the highest was 76°, at Texarkana on the 1st, and the lowest, 2° below zero, at Silver Springs on the 27th. The average precipitation was 6.53, or 2.47 above normal; the greatest monthly amount, 13.83, occurred at Pinebluff, and the least, 3.57, at Picayune.—*F. H. Clarke.*

California.—The mean temperature was 45.5°, or 0.1° below normal; the highest was 82°, at Coronado and Nordhoff on the 22d, and the lowest, 14° below zero, at Bodie on the 18th. The average precipitation was 2.69, or 1.83 below normal; the greatest monthly amount, 9.10, occurred at Muth Flat, Ventura County, and the least 0.32, at Bishop, Inyo County. The unusual feature of the month was the greater rainfall in southern California as compared with the central and northern portions, the greatest rainfall occurring south of the Tehachapi range of mountains, while the least amount was in central and eastern California. This reverses the usual precipitation for the month of January. The excess of rainfall will be very beneficial to southern California, as the seasons have been drier than usual for several years past.—*J. A. Barwick.*

Colorado.—The mean temperature was 21.8°, or 3.0° above normal; the highest was 67°, at Cripple Creek on the 10th and 11th, and at Minneapolis on the 23d, and the lowest, 32° below zero, at Lay on the 27th. The average precipitation was 0.82, or 0.8 below normal; the greatest monthly amount, 8.60, occurred at Ruby, and the least, 0.06, at Lamar.—*P. H. Brandenburg.*

Florida.—The mean temperature was 56.2°, or 3.8° below normal; the highest was 86°, at Kissimmee on the 4th, and the lowest, 17°, at Pensacola on the 28th. The average precipitation was 1.90; the greatest monthly amount, 5.20, occurred at Jupiter, and the least, 0.18, at Kissimmee.—*A. J. Mitchell.*

Georgia.—The mean temperature was 42.6°, or 2.8° below normal; the highest was 77°, at Morgan on the 2d, Quitman on the 1st and 3d, and Brag on the 3d; the lowest was 6° below zero, at Tallapoosa on the 27th. The average precipitation was 2.66, or 2.44 below normal;

the greatest monthly amount, 5.89, occurred at Diamond, and the least, 0.59, at Poulan.

Idaho.—The mean temperature was 23.1°; the highest was 58°, at Pollock on the 22d, and the lowest, 30° below zero, at Lake and Warren on the 26th. The average precipitation was 0.78; the greatest monthly amount, 2.82, occurred at Fort Sherman, while none fell at Martin.—*D. P. McCallum.*

Illinois.—The mean temperature was 24.1°, or 0.5° above normal; the highest was 70°, at Mt. Vernon on the 1st, and the lowest, 28° below zero, at Oregon on the 25th. The average precipitation was 4.59, or 2.30 above normal; the greatest monthly amount, 10.38, occurred at La Harpe, and the least, 1.96, at Scales Mound.—*O. E. Linney.*

Indiana.—The mean temperature was 25.3°, or 0.8° below normal; the highest was 68°, at Vevay on the 1st and 3d, and lowest, 22° below zero, at Lafayette on the 25th. The average precipitation was 3.39, or 0.48 above normal; the greatest monthly amount, 5.97, occurred at Valparaiso, and the least, 1.73, at Greensburg. The weather during the month was not very favorable for wheat and clover, but there is no doubt that a good covering of snow during the greater part of the month protected these crops from greater injury during the exceedingly cold nights in the latter part of the month.—*O. F. R. Wappenhans.*

Iowa.—The mean temperature was 17.2°; the highest was 66°, at Keokuk and Madrid on the 1st, and the lowest, 30° below zero, at Rock Rapids on the 25th and at Elkador on the 26th. The average precipitation was 2.01; the greatest monthly amount, 6.16, occurred at Fort Madison, and the least, 0.15, at Portsmouth.—*G. M. Chappel.*

Kansas.—The mean temperature was 28.4°, or 0.4° above normal; the highest was 68°, at Columbus and Ottawa on the 1st, and the lowest, 16° below zero, at Goodland on the 27th. The average precipitation was 1.10, or 0.36 above normal; the greatest monthly amount, 5.46, occurred at Columbus, and the least, "trace," at Goodland and Grainfield.—*T. B. Jennings.*

Kentucky.—The mean temperature was 32.0°; the highest was 75°, at Ashland on the 3d, and the lowest, 16° below zero, at Louisa on the 30th. The average precipitation was 3.25, or 0.73 below normal; the greatest monthly amount, 4.96, occurred at Pilot Oak, and the least, 2.10, at Louisa. The general effects of the low temperature that prevailed the last week have not yet been ascertained definitely, but it is not likely they will be of a serious nature. The cold wave set in on the night of the 24th, and a general fall of snow occurred on the 27th, which was the central date of the cold period. This snow aided materially in heating the soil at about the time when it had become thoroughly frozen. It is probable that winter grain withstood the cold spell without much injury to the crop. Winter pastures had been excellent up to the period of cold weather.—*Frank Burke.*

Louisiana.—The mean temperature was 47.5°, or 3.1° below normal; the highest was 80°, at Melville on the 3d, and the lowest, zero, at Farmerville on the 28th. The average precipitation was 5.50, or 0.94 above normal; the greatest monthly amount, 12.20, occurred at Oberlin, and the least, 1.88, at Lawrence. It is evident that the severe cold of the latter part of January did considerably less damage than was expected, even to the orange trees and tender vegetation, and none

worthy of mention to the cane crop, either plant, seed, or stubble. December and the greater portion of January were rather dry, and plowing and some planting had progressed very favorably until the last week of January, when the cold weather and rain, sleet, and snow put a stop to all farm work.—*R. E. Kerkam.*

Maryland.—The mean temperature was 29.5°, or 2.5° below normal; the highest was 66°, at Jewell on the 4th, and the lowest, 12° below zero, at Deer Park on the 13th. The average precipitation was 1.95, or 1.33 below normal; the greatest monthly amount, 3.97, occurred at Grantsville, and the least, 0.81, at Milford, Del. Precipitation was fairly well distributed, although the greater portion fell during the second decade of the month; the deficient amount received during this and the preceding month has, however, caused a shortage in the water supply of some sections of the State. No snowfall of consequence occurred prior to the 13th, but since that date the amount of snowfall has sufficed to give total monthly depths ranging from 4 inches in the eastern sections to 20 and 28 inches in the mountain districts of western Maryland. Temperatures were above normal generally until the 24th, but the cold-wave period that set in at that time and lasted till the close of the month caused such marked temperature departures as to give a monthly mean of less than normal. Fortunately grain fields were protected from damage during the extreme cold of this period by an ample covering of snow.—*G. E. Hunt.*

Michigan.—The mean temperature was 20.7°, or 0.6° below normal; the highest was 59°, at several stations on the 2d, 3d, and 4th, and the lowest, 42° below zero, at Humboldt on the 19th. The average precipitation was 3.98, or 1.73 above normal; the greatest monthly amount, 9.05, occurred at Hart, and the least, 1.15, at Humboldt.—*O. F. Schneider.*

Minnesota.—The mean temperature was 72°, or about normal; the highest was 59°, at Winona on the 1st, and the lowest, 49° below zero, at Pokegama on the 25th and 26th. The average precipitation was 1.77, or 0.58 above normal; the greatest monthly amount, 4.80, occurred at Milan, and the least, 0.20, at Belle Plaine. During the whole month all the State has had an abundant covering of snow, which in many places has been blown into immense drifts. The average depth in central portions has been estimated as great as 18 inches.—*T. S. Outram.*

Mississippi.—The mean temperature was 43.7°, or 2.1° below normal; the highest was 76°, at Waynesboro on the 13th, and the lowest, 2° below zero, at Water Valley. The average precipitation was 5.45, or 0.05 below normal; the greatest monthly amount, 8.73, occurred at Fayette, and the least, 2.01, at Thornton. The protracted cold spell at the close of the month, which had its beginning with the arrival of a severe cold wave on the 24–25th, was attended by very light snow, with some sleet; on these dates at a few scattered points, and on the 26th sleet, mixed with snow, fell to a depth ranging from 3 inches in the northern portion to 0.5 inch near the coast. Warmer weather, with general rain, on the last days of the month caused sleet and snow to disappear entirely. Preparations for early market gardening and truck farms, as well as general farming operations, were begun early in the month, and its close found farm work well advanced for the season. The cold weather placed the soil in a mellow condition, and it is being easily broken.—*R. J. Hyatt.*

Montana.—The mean temperature was 20.0°, or 7.0° above normal; the highest was 75°, at Billings on the 18th, and the lowest, 46° below zero, at Poplar on the 23d. The average precipitation was 0.74, or 0.19 below normal; the greatest monthly amount, 2.21, occurred at Columbia Falls, and the least, "trace," at Sun River.—*R. M. Crawford.*

Nebraska.—The mean temperature was 21.8°, or 3.0° above normal; the highest was 66°, at Lexington on the 8th, and the lowest, 22° below zero, at Lodgepole on the 26th. The average precipitation was 0.79, or 0.11 above normal; the greatest monthly amount, 2.50, occurred at Hartington, and the least, "trace," at Curtis, McCook, and Madrid.—*G. A. Loveland.*

Nevada.—The mean temperature was 30.2°, or 3.1° above normal; the highest was 65°, at Lovelock on the 6th, and the lowest, 12° below zero, at Wells on the 16th. The average precipitation was 0.92, or 0.48 below normal; the greatest monthly amount, 3.30, occurred at Tylo, and the least, "trace," at Carlin and Hot Springs.—*R. F. Young.*

New England.—The mean temperature was 23.0°, or 1.9° above normal; the highest was 60°, at Somerset, Mass., on the 4th, and at Hyde Park and Boston, Mass., on the 5th, and the lowest, 29° below zero, at Berlin Mills, N. H., on the 31st. Over most of Maine, New Hampshire, and Massachusetts the precipitation was quite evenly distributed, the exceptions being here and there a limited area of large or small totals. In the other States there was mainly a wide difference between the minimum and maximum total falls, especially so in Maine. In that State the range in the monthly amounts was from about 1.4 in the north-eastern portion to 5.4 in the west-central portion. Central and southern Maine received a trifle more than the average rainfall; the same is true of New Hampshire, but not of Vermont. In Massachusetts the precipitation was considerably deficient, generally speaking. Providence, R. I., reported the largest amount of the month, 6.24; the smallest was 1.44, at Fort Fairfield, Me.—*J. W. Smith.*

New Jersey.—The mean temperature was 29.0°, or 0.5° below normal; the highest was 64°, at Barnegat on the 3d, and the lowest, 6° below zero, at Franklin Furnace on the 31st. The average precipitation was

2.80, or 1.08 below normal; the greatest monthly amount, 4.21, occurred at Englewood, and the least, 1.70, at Deckertown. The average depth of snow was largely in excess of the normal.—*E. W. McGann.*

New Mexico.—The mean temperature was slightly below normal; the highest was 76°, at Shattucks Ranch on the 26th, and the lowest, 23° below zero, at Buckmans on the 3d. The average precipitation was slightly above normal; the greatest monthly amount, 2.58, occurred at Chama, and the least, 0.20, at Raton.—*H. B. Hersey.*

New York.—The mean temperature was 22.8°, or 0.4° below normal; the highest was 62°, at Ogdensburg on the 4th, and the lowest, 26° below zero, at Number Four and Ogdensburg on the 25th. The average precipitation was 2.67, or 0.15 below normal; the greatest monthly amount, 6.78, occurred at Palermo, and the least, 0.60, at Eagle Mills.—*R. M. Hardinge.*

North Carolina.—The mean temperature was 37.0°, or 3.0° below normal; the highest was 74°, at Newbern on the 4th, and the lowest, 12° below zero, at Waynesville on the 28th. The average precipitation was 2.30, or 2.00 below normal; the greatest monthly amount, 5.04, occurred at Highlands, and the least, 0.92, at Falkland.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 3.6°, or 0.6° above normal; the highest was 49°, at Oakdale on the 7th, and the lowest, 38° below zero, at Fort Yates on the 25th. The average precipitation was 0.79, or 0.20 above normal; the greatest monthly amount, 2.04, occurred at Forman and Hamilton, and the least, "trace," at White Earth and Willow City.—*B. H. Bronson.*

Ohio.—The mean temperature was 25.5°, or 1.2° below normal; the highest was 71°, at Lowell on the 4th, and the lowest, 27° below zero, at Levering on the 26th. The average precipitation was 1.93, or 1.04 below normal; the greatest monthly amount, 5.05, occurred at Ashtabula Harbor, and the least, 0.67, at Celina and Warsaw. No uneasiness is felt regarding the effect of the cold wave on wheat, it having been well protected with snow from the 18th to the 31st. The cold wave may have damaged fruit trees, but to what extent is not yet known, it being too early in the season to accurately ascertain.—*H. W. Richardson.*

Oregon.—The mean temperature was 37.9°, or 1.9° above normal; the highest was 68°, at Prineville on the 24th, and the lowest, 9° below zero, at Pendleton on the 26th. The average precipitation was 3.47, or 2.99 below normal; the greatest monthly amount, 12.89, occurred at Glenora, and the least, 0.25, at Silver Lake. The weather was favorable for plowing and seeding and considerable of both was done during the month.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 25.6°, or 2.1° below normal; the highest was 74°, at Cannonsburg on the 3d, and the lowest, 25° below zero, at Saegertown on the 31st. The average precipitation was 2.15, or 1.35 below normal; the greatest monthly amount, 3.54, occurred at Confluence, and the least, 0.87, at Elwood Junction.—*T. F. Townsend.*

South Carolina.—The mean temperature was 42.2°, or 3.8° below normal; the highest was 76°, at Yemassee on the 7th, and the lowest, 3°, at Walhalla on the 28th. The average precipitation was 2.29, or 2.11 below normal; the greatest monthly amount, 4.80, occurred at Holland, and the least, 0.13, at Batesburg. Many lands were plowed preparatory for spring seeding.—*J. W. Bauer.*

South Dakota.—The mean temperature was 11.0°, or about normal; the highest was 64°, at Rapid City on the 8th, and the least, 35° below zero, at Watertown on the 24th. The average precipitation was 1.65, or 1.14 above normal; the greatest monthly amount, 5.69, occurred at Webster, and the least, 0.10, at Edgemont.—*S. W. Glenn.*

Tennessee.—The mean temperature was 35.3°, or 1.5° below normal; the highest was 74°, at Tellico Plains on the 3d, and the lowest, 17° below zero, at Rugby on the 29th. The average precipitation was 3.46, or 1.36 below normal; the greatest monthly amount, 5.16, occurred at Union City, and the least, 1.96, at Benton. The month was warm up to the night of the 24th, when a severe cold wave overspread the State and continued to the 31st, with the coldest weather on the 28th and 29th. This cold period was productive of much suffering among both men and animals, more on account of its length than its severity.—*H. C. Bate.*

Texas.—The mean temperature for the State was 3.6° below the normal; there was a general deficiency throughout the State, which ranged from 0.9° to 5.3° over west and southwest Texas and the coast district, and from 1.1° to 8.7° over the Panhandle and north, central, and east Texas, with the greatest deficit over the Panhandle. The highest temperature was 88°, at College Station on the 10th, and the lowest, 7° below zero, on the 27th. The average precipitation for the State was 0.22 above the normal; it was not very well distributed, there being an excess in some localities, while near by there was a deficiency. On an average it ranged from about normal to 1.68 above, over north, central, and west Texas, and the Panhandle, and from 0.01 to 1.71 above over the northern portion of east Texas, over the western portion of southwest Texas, and over the extreme west and east portions of the coast district; there was a deficiency ranging from 0.10 to 1.32 over the eastern portion of southwest Texas, over the southern portion of east Texas, and over the central portion of the coast district, with the greatest deficit in the vicinity of Luling. The greatest monthly amount, 6.95, occurred at Colmesneil, and the least, 0.15, at Sierra Blanca. The severe cold wave which crossed the

State during the last decade put a stop to all farming work and there was very little being done on the farm at the close of the month. The rain and snow during the latter part of the month put an excellent season in the ground, and with favorable weather farming operations will be rushed. The warm weather during the first and second decades of January was exceptionally favorable for the wheat crop, and prospects for a good crop were never better, but the cold weather, with temperatures near zero over the wheat belt during the latter part of the month, damaged the crop to some extent, especially where the ground was not covered with snow. It is believed that with favorable weather the plant will come out and recover from the effects of the damage sustained by the severe cold weather and a fair crop will yet be made.—*I. M. Olm.*

Utah.—The mean temperature was 26.1°; the highest was 68°, at Frisco on the 6th, and the lowest, 24° below zero, at Fort Du Chesne on the 28th. The average precipitation was 1.53; the greatest monthly amount, 3.80, occurred at Grover, and the least, 0.20, at Woodruff.—*J. H. Smith.*

Virginia.—The mean temperature was 32.7°, or 4.2° below normal; the highest was 70°, at Ashland and Petersburg on the 4th, and the lowest, 15° below zero, at Bristol on the 28th and at Big Stone Gap on the 30th. The average precipitation was 1.94, or 2.44 below normal; the greatest monthly amount, 5.00, occurred at Manassas, and the least, 0.90, at Buckingham and Stanleytown. The month was generally mild

and pleasant until the 25th, when a period of cold and stormy weather prevailed, which was unusual for this section. Ice thick enough for harvesting formed in nearly every portion of the State, while sufficient snow to yield good sleighing fell generally.—*E. A. Evans.*

Washington.—The mean temperature was 34.8°, or 0.5° above normal; the highest was 62°, at Dayton on the 22d, and the lowest, 15° below zero, at Waterville on the 28th. The average precipitation was 4.28, or 1.10 below normal; the greatest monthly amount, 15.56, occurred at Clearwater, and the least, 0.83, at Sunnyside.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 28.8°, or about 4.0° below normal; the highest was 69°, at Point Pleasant on the 3d, and the lowest, 18° below zero, at Beckly on the 26th. The average precipitation was 1.70, or 1.50 below normal; the greatest monthly amount, 2.85, occurred at Beverly, and the least, 0.90, at White Sulphur Springs.—*H. L. Ball.*

Wisconsin.—The mean temperature was 15.4°, or 1.4° above normal; the highest was 66°, at Prairie du Chien on the 1st, and the lowest, 38° below zero, at Osceola Mills on the 26th. The average precipitation was 1.98, or 0.70 above normal. The greatest monthly amount, 4.11, occurred at Sharon, and the least, 0.19, at Oshkosh.

Wyoming.—The mean temperature was 1.95, or about normal; the highest was 62°, at Fort Laramie on the 9th, and the lowest, 32° below zero, at Sheridan on the 26th. The average precipitation was 0.55, or about normal; the greatest monthly amount, 2.00, occurred at Sundance, and the least, 0.12, at Fort Washakie.—*M. G. Renoe.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The extreme and average stages of water in the rivers for the current month are given in the following table. Heavy rains and higher rivers are reported in the Ohio Valley but little damage has occurred. The Upper Mississippi and the Ohio were closed to navigation by ice at the end of the month.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

Hudson River.—On the first day of January an average of 4 inches of snow covered the watershed area of the Hudson. The mild temperatures of the first four days of the month reduced this depth, and by the 12th practically no snow remained on the ground. The storms of the week ending January 25, which passed down the St. Lawrence Valley, covered the watershed with from 3 to 6 inches of snow, and this was increased by the close of the month to an average of 9 inches on the upper Hudson watershed and 3 inches on the lower watershed area. The foggy and warm conditions of the first week of January honeycombed the ice in the upper Hudson and caused the ice in the river south of Newburg to disappear. During the second week the ice in the harvesting districts was soft and filled with many small holes. Floating ice was observed in the river at Newburg. The thaw of the third week softened the upper Hudson ice and broke up the Lower Hudson fields from Poughkeepsie southward. By the 25th new ice fields formed in the lower Hudson to the thickness of from 3 to 5 inches and those of the upper Hudson received some accretion. The average depth of frost in the ground is 3 feet. The weather and temperature conditions of the Hudson River district during the month were variable, and as a result, the close of the month finds the river ice not in the best condition for housing, except in the northern districts.

Susquehanna River and branches.—No floods occurred in the Susquehanna or any of its branches during the month. Although the rainfall for January averaged, for all reporting stations, double the amount for December the average reading of the gauges for January was slightly lower than that for the preceding month. This was doubtless due to the colder weather of January which caused many of the smaller streams to freeze and the water ordinarily contributed by many springs to be cut off by freezing soon after leaving its source and spread out into sheets of ice, which will continue to expand until the weather moderates and a general thaw releases the water from its frozen state. At Cameron, on Driftwood Creek, the most northwesterly station on the West Branch of the Susquehanna, the stream, which was frozen over on December 27, opened on January 2, but closed again on the 13th and remained closed the rest of the month; at Driftwood, the next station south, the branch had not yet closed at the end of January. At Sinnemahoning, the next point of observation, the water was below zero of the gauge all the month. Cedar Run reports ice from the 10th to the 16th, and again from the 24th to the 31st, with gauge readings below zero all the month. At Keating the river was closed from the 24th to the 31st, and at Renova it froze over December 24 and re-

mained closed till January 5, was opened from the 6th to the 13th, and closed again from the 14th to the 31st. The river at Farrandville was closed during the whole month while at Lock Haven and Williamsport no ice was reported. The Juniata, at Mifflin closed for the second time this winter on January 12, while at Huntingdon no ice has yet been reported. On the North Branch the river at East Bloomsburg continued at a uniform stage of a little over 2 feet except on the 6th, when a rise of 1.5 feet occurred, followed by a fall of 1 foot on the 7th. Perhaps the most interesting feature of the month was the sudden fall of over a foot at Harrisburg on the 26th and the sharp rise on the 27th. Floating ice was observed on the river from the 1st to the 26th in greater or lesser quantities nearly every day and at times sufficient to cover the whole surface. On the 25th and 26th, when the temperature fell almost to the zero point, the freezing of the springs and streams above Harrisburg suddenly cut off an enormous quantity of water, thus causing a marked fall at Harrisburg. On the following day, owing probably to a considerable volume of water which had been temporarily held in check having been released by warm currents from springs forcing an outlet beneath the ice and possibly to back water from gorges, the river rose higher than it registered before the surface was frozen. At the close of the month the ice averaged 8 inches in thickness at Harrisburg. In the main channel the ice is very rough, having been formed by the gorging of floating ice when the river closed, which occurrence took place at about 4 a. m. on January 27. The ice at Columbia broke up and moved out on January 5, the river having been closed since Christmas night; but it closed again during the month, and at the end of January transfers of passengers were being made by sleighs between Columbia and Wrightsville instead of by the ferry boats which have been in use since the destruction of the bridge by the hurricane of September 29 and 30, 1896.

Rivers of the South Atlantic States.—Owing to the scarcity of precipitation during the month, the James River, already low from deficient rainfall, continued to fall slowly until the 11th, when it reached the lowest point recorded this winter, 0.2 foot below zero of gauge. From this time until the last decade of the month it remained stationary. On the 20th a slight rise occurred under the influence of precipitation occurring at points on the upper watershed, but this was soon checked by freezing weather, which prevented drainage and locked up the tributary streams. This condition lasted until the close of the month, with the river falling slowly. The water was remarkably clear and free from impurities all of the month. Ordinarily any appreciable precipitation in the Rivanna basin will cause that stream to pour a volume of muddy water into the James, which will discolor it for a week or more, and that such was not the case with the precipitation of the 27th and 28th was due to the drainage being stopped by the cold weather prevailing at the time.

The rivers of North Carolina continued low during the greater portion of January. No floods or even sudden and threatening rises occurred. The precipitation occurring from the 1st to the 4th and on the 13th, 14th, and 17th was too small to cause material changes in the stages of the rivers. The heavier rainfall of the 20th and 21st, however, caused a rapid rise on the 22d in the eastern portion of the State, reaching 10 feet in the Cape Fear River, altogether a beneficial rise. The stages resumed their low level at the end of the month, and the